Spectroscopy

HOMOGENEOUS LINEWIDTHS OF THE 2F5/2 TO 2F7/2 TRANSITION OF YTTERBIUM IN A FLUOROPHOSPHATE GLASS

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Our group previously reported on the unusual magnitude and temperature dependence of the homogeneous linewidth of the 5D0 - 7F0 transition of trivalent europium in a fluorophosphate glass[1]. It was speculated that this unusual behaviour is the related to the observation of divalent as well as trivalent europium in the samples. It is well known that ytterbium also occurs in the divalent form in solids[2], so we have prepared fluorophosphate glass samples containing ytterbium and ytterbium and europium together to study the effect of valence state on the coherence of optical transitions. We carried out resonant fluorescence line-narrowing measurements using either a pulsed dye laser or a cw diode laser to determine the homogeneous linewidth of the 2F5/2 - 2F7/2 transition of trivalent ytterbium in a fluorophosphate glass as a function of temperature, concentration and wavelength. These results will be compared to previous reports on the homogeneous linewidth of this transition in other glasses[3,4].

[1] R. T. Brundage and Christian S. Reyerson, “Homogeneous linewidth of the 5D0 - 7F0 transition of trivalent europium in a fluorophosphate glass,” Physical Review B53, 8821 (1996).
[2] J. Rubio, “Doubly-valent rare-earth ions in halide crystals,” Journal of the Physics and Chemistry of Solids, 52,101(1991).
[3] G. Lei, J. E. Anderson, M. I. Buchwald, B. C. Edwards, R. I. Epstein, “Determination of spectral linewidths by Voigt profiles in Yb3+-doped fluorozirconate glasses,” Physical Review B57, 7663, (1998).
[4] R. T. Brundage and W. M . Yen, “Low-temperature homogeneous linewidths of Yb3+ in inorganic glasses,” Physical Review B33, 4436 (1986).